DOCUMENT RESUME

ED 218 847 EC 143 109

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TITLE The Effect of IEP Monitoring Strategies on Teacher Behavior.
INSTITUTION Minnesota Univ., Minneapolis. Inst. for Research on Learning Disabilities.
SPONS AGENCY Office of Special Education and Rehabilitative Services (ED), Washington, DC.
REPORT NO IRLD-RR-62
PUB DATE Dec 81
CONTRACT 300-80-0622
NOTE 37p.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Disabilities; Educational Objectives; Goal Orientation; *Individualized Education Programs; *Measurement Techniques; Special Education Teachers; *Teacher Attitudes

ABSTRACT

The effects of individualized education program (IEP) monitoring strategies on 20 special education teachers' long term and short term estimates of student achievement, their satisfaction with students' programs, and their modifications in students' programs was examined. Teachers were randomly assigned to an IEP monitoring treatment: short term goal measurement (STGM) or long term goal measurement (LTGM). Analyses revealed that the teachers' long term estimates of student achievement were unrealistically high and similar in both treatment groups. Their short term estimates were conservative, but more optimistic and realistic for the STGM group. Additionally, the STGM teachers were more satisfied with their students' programs and introduced instructional program changes less frequently. (Author)

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ED218847

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Research Report No. 62

THE EFFECT OF IEP MONITORING STRATEGIES ON TEACHER BEHAVIOR

Phyllis Mirkin, Lynn Fuchs, Gerald Tindal,

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December, 1981

Abstract

The study examined the effect of IEP monitoring strategies on teachers' long-term and short-term estimates of student achievement, their satisfaction with students' programs, and their modifications in students' programs. Subjects were 20 special education teachers, each of whom selected three to four students for participation in the study. Teachers were assigned randomly to an IEP monitoring treatment: Short-Term Goal Measurement (STGM) or Long-Term Goal Measurement (LTGM). Analyses revealed that the teachers' long-term estimates of student achievement were unrealistically high and similar in both treatment groups. Yet, their short-term estimates were conservative, but more optimistic and realistic for the STGM group. Additionally, the STGM teachers were more satisfied with their students' programs and introduced instructional program changes less frequently. Possible explanations and implications for IEP monitoring strategies are discussed.

The Effect of IEP Monitoring Strategies on Teacher Behavior

Gathering and using information to shape and reshape instructional programs that meet individual student needs is an essential, if not the most essential, task of teaching. What kinds of information do teachers gather? Salmon-Cox (1981) reported that teachers prefer informal techniques, including observation, teacher-made tests, and "interaction" with students, for gathering information on student achievement. Teachers infrequently described formal, standardized test information as useful in reshaping instructional programs. Salmon-Cox noted that teachers seemed to prefer "continuous movies, in color with sound."

An approach to data gathering that provides teachers with frequent, albiet not continuous, pictures of student achievement is direct and frequent measurement of student performance using systems variously described as Continuous Evaluation of IEP Goals (Mirkin, Deno, Fuchs, Wesson, Tindal, Marston, & Kuehnle, 1981), Data-Based Program Modification (Deno & Mirkin, 1977), Exceptional Teaching (White & Haring, 1980), and Precision Teaching (Lindsley, 1971). Models of direct and frequent measurement include procedures for goal selection, measurement of goal achievement, and data analysis to help teachers decide whether and how to restructure curriculum to be consistent with the needs of individual students.

Although the different systems for collecting direct and frequent measurements of student performance are similar in their basic approaches to obtaining pictures of student achievement, they differ in their recommendations about the types of data to collect, the format of graphs

on which data are recorded, the ways in which data are to be utilized, and the frequency with which data are collected. The purpose of the present study was to determine the effects of two variations of direct and frequent measurement on teacher decision making. Specifically, the study addressed the following questions:

(a) Do teachers' long-term and short-term estimates of student achievement differ with the two variations of data collection and utilization procedures?

(b) Does teacher satisfaction differ with the two procedures?

(c) Do teacher modifications in programs differ with the two procedures?

Method

Subjects

Twenty special education resource teachers from a midwestern metropolitan area volunteered to serve as subjects in the study. These teachers (2 males and 18 females) had taught school for an average of 9.6 years (SD = 6.9). Each teacher selected three to four students from his/her caseload, resulting in a student sample of 73 boys and 15 girls. The students' mean age was 10.3 years (SD = 1.9); their mean grade level was 3.9.

Materials

Training manuals. Teacher training manuals for two experimental conditions were written expressly for the study. Both manuals consisted of six chapters on the assumptions of systematic instruction, and procedures for placing students, setting long-term goals, measuring students, recording and graphing data, and changing student programs. These materials were self-instructional and each chapter concluded with a mastery test. Two chapters, "Measuring Students" and "Recording

and Graphing Data," differed for the two groups; these chapters reflected the experimental treatments described below.

Word cards. Word cards organized in instructional units from each student's existing reading materials were prepared for the teachers and were employed as flashcards in the measurement procedure.

Dependent Measures

Two types of dependent measures were employed. The first type was an interview checklist on which teacher decision-making information was recorded, including (a) how, why, and when program adjustments were made, (b) teacher re-estimates of long-term goals, and (c) teacher short-term estimates of student performance collected each time a teacher introduced a program change (see Teacher Interview Questions in Appendix). The second type of dependent measure was a teacher ranking form on which teachers selected and rank ordered, for each student, five effective program changes from among eight instructional, eight motivational, and eight administrative and physical arrangement alternatives (see Teacher Ranking Form in Appendix).

Procedure

Experimental conditions. Teachers were assigned randomly to one of two experimental treatment groups for the purpose of measuring student progress: Long-Term Goal Measurement (LTGM) or Short-Term Goal Measurement (STGM). In the LTGM condition, teachers tested students' reading performance by administering a 30-second word recognition test comprised of 25 words randomly selected from a large set of vocabulary words to be introduced within the 12-week period. At each measurement session teachers were required to graph the student's performance; on the sixth through ninth days, they were required to review the graphed

data. If these data indicated that progress was inadequate, then the teachers were to introduce an adjustment in the program in an attempt to improve the effectiveness of the instruction. After 10 days, teachers were required to make an adjustment if one had not been made previously. This routine was repeated several times in the 12-week experimental period. (See Figure 1 for example of a graph.)

Insert Figure 1 about here

In the STGM group, teachers tested students' reading performance by administering a 30-second word recognition test comprised of the new vocabulary words introduced in the current instructional period plus words sampled from preceding stories, for a total of 25 words. Teachers graphed the student's performance and compared that performance against a short-term aim line, which the teachers drew on a graph each time a new short-term goal was established. Teachers were asked to review the graphs frequently to determine when to move to the next story and/or when to make a program adjustment. This routine continued throughout the 12-week period. (See Figure 2 for example of a graph.)

Insert Figure 2 about here

Training. At the first of two 1½ hour sessions, teachers were trained in procedures for placing students in their curricula. These procedures required students to read, in the currently employed basal reading series, three one-minute samples on each of the three highest levels at which the student could read approximately 30-49 words per minute (wpm) with fewer than eight errors for poor readers, and 50-99

wpm with fewer than eight errors for better readers. After three days of data collection, teachers were to compute a median wpm and median errors per minute for each level, and place the student at the highest level at which the above criteria were met.

Having been trained in this placement procedure, teachers implemented it when they returned to their schools. Although teachers had been advised to place a student in the highest level at which the student met the performance standard, they often used other criteria such as previous placement, intuition, and logistical feasibility of placements. Between training sessions, teachers also completed reading and answering questions in the training manuals.

At the second training session, training manual mastery tests were scored. Additionally, teachers set long-term (12-week) goals, as instructed in the manual, and submitted a list of all vocabulary words included in those long-term goals. These words were made into word card packs.

Teacher visits. One week after the second training session, a graduate research assistant (RA) delivered the word packs to each teacher and helped the teachers set up student graphs. The teachers then began to implement the measurement strategies.

An RA was assigned to each teacher; over the 12-week treatment period, RAs made weekly 10- to 20-minute visits to their assigned teachers. During each of those visits, the RAs provided additional training as required, and recorded information on the interview check-

list. When completing the checklist, the RA determined whether the teacher wished to revise the long-term goal prediction and, if so, what the new LTG was. The RA also determined whether the teacher had made a change in the student's program, and whether the change was an instructional, motivational, or physical arrangement change. Further if a change was made, the RA recorded the teacher's new prediction of the student's short-term achievement (i.e., the student's median level of words correct and errors over the new program phase). Finally, the RA noted the teacher's judgment of the effectiveness of the previous week's program for each student. At Weeks 3, 6, 9, and 12, teachers completed the Teacher Ranking Forms.

Results

Long-term and Short-term Estimates of Student Achievement

Long-term estimates. The mean number of revisions in long-term goals was compared for the STGM and the LTGM conditions; a *t* test revealed no significant difference between measurement groups. Teachers typically made from one to three revisions in the students' LTGs.

When goal estimates were averaged across the 12 weeks, the number of words that the teachers had predicted would be mastered was the same for the STGM and LTGM conditions. The initial and final predictions of the number of words that would be mastered also were compared for the two measurement conditions; a *t* test revealed a statistically significant difference for the initial predictions ($t = 2.08$, $p = .04$). The

means in Table 1 indicate that the LTGM teachers initially predicted a greater number of words to be mastered than did the STGM teachers. However, by the last week in the study, most LTGM teachers had revised their predictions downward, rendering a final mean estimate more similar to that of the STGM teachers, whose final mean prediction was very close to their original mean prediction.

Insert Table 1 about here

At the end of the 12-week experimental period, teachers reported the number of words each student had actually mastered in his/her curriculum; a *t* test applied to these data revealed no statistically significant difference between the STGM and LTGM groups. Students in the LTGM group mastered an average of 203.1 words (SD = 153.3); students in the STGM group mastered an average of 164.8 words (SD = 131.0).

The accuracy of teachers' LTG predictions was defined as the difference between the number of words actually mastered and the average LTG prediction for each subject. These differences were aggregated for the STGM and LTGM groups and were subjected to a *t* test, which revealed no statistically significant difference. Teachers in both groups predicted that students would master more words than they actually did master. The STGM teachers over-predicted by an average of 20.82 words (SD = 78.89); LTGM teachers over-predicted by an average of 9.71 words (SD = 100.35).

Short-term estimates. Short-term estimates were the teachers'

predicted median levels of words correct and errors over upcoming program phases. These predicted median levels of performance were aggregated for the STGM and the LTGM groups and were subjected to *t* tests; the results revealed statistically significant differences for words correct and incorrect per minute (t = 4.38 and 3.11, p = .000 and .003, respectively). The STGM teachers predicted more words correct and fewer errors than the LTGM teachers (see Table 2).

Insert Table 2 about here

An analysis of the accuracy of these predictions also was performed. Accuracy was defined as the difference between a teacher's prediction and the student's obtained score. This difference was calculated for each intervention and then the average difference per intervention was computed for each measurement group. The STGM teachers underpredicted the students' correct performance by a mean of .21 words. The LTGM teachers underpredicted the student's correct performance by a mean of 1.61 words. The STGM teachers' predictions were more accurate than those of LTGM teachers, $t(60) = 4.1$, $p = .000$. The STGM teachers also predicted students' errors more accurately than LTGM teachers, $t(60) = 5.1$, $p = .0000$, with the STGM teachers underpredicting errors by an average of .07 words and the LTGM teachers underpredicting errors by an average of .49 words.

Satisfaction with Students' Programs

Each week teachers judged for each of their students whether the previous week's program had been effective. There was a

statistically significant relation between the measurement treatment and the number of weeks during which programs were judged effective (χ^2 = 29.12, p = .002). The number of weeks in which higher percentages of STGM teachers judged their students' programs as effective was greater than that for the LTGM teachers.

Modifications in Students' Programs

During the weekly visits, RAs determined whether teachers had made an instructional change, a motivational change, or a physical arrangement change in their students' programs. Aggregated over Weeks 1-3, Weeks 4-6, Weeks 7-9, and Weeks 10-12, teachers made a greater percentage of instructional changes than any other type of change (see Table 3).

Insert Table 3 about here

Teachers made no change in the program from 5 to 12 times during the study. The percentages of teachers at each frequency level are displayed in Table 4. A chi square analysis revealed that greater percentages of the STGM teachers made no change in their students' programs ($\chi 2$ = 48.5, p = .000). Approximately 83% of STGM teachers made no change in their student's programs 9 to 12 times, while 11.3% of LTGM teachers made no change 9 to 12 times (see Table 4). Table 5 presents the percentages of teachers making instructional, motivational, and physical arrangement changes at different frequency levels. This table shows that, for changes that were made, greater percentages of LTGM than STGM teachers made more motivational changes (see Table 5).

Insert Tables 4 and 5 about here

Figure 3 displays the percentages of teachers, averaged over Weeks 3, 6, 9, and 12, that ranked instructional, motivational, or physical arrangement changes as first, second, third, fourth, or fifth most effective. Inspection of this figure reveals that motivational changes were selected least often as most effective for students; physical changes were selected least often as second through fifth most effective. The greatest percentage of teachers' top three selections were instructional changes, while the percentages of their fourth and fifth selections were distributed between instructional and motivational changes.

Insert Figure 3 about here

Discussion

Initially, the LTGM teachers predicted that their students would master a greater number of words in 12 weeks than did the STGM teachers; however, they revised their estimates to render them more similar to those of the STGM teachers. In both measurement conditions teachers made one to three revisions in their LTGs; the final accuracy of those long-term estimates was similar, with both sets of teachers overpredicting the number of words that would be mastered during the 12-week study. Therefore, teachers' long-term estimates of student achievement did not differ as a function of the type of data collected. Both groups overpredicted long-term goals.

While teachers' long-term estimates of student growth tended to be

unrealistically high, their short-term estimates were conservative. Both groups of teachers underpredicted the number of correct words students would read during the upcoming program phases. However, the STGM teachers predicted that their students would read more words correct and make fewer errors than the LTGM teachers predicted for their students. Further, STGM teachers' predictions were more accurate. Consequently, it appears that teachers' short-term estimates differed as a function of the type of data they collected. Teachers who monitored students' attainment of a series of short-term objectives, which changed approximately weekly, predicted performance more accurately and less pessimistically than their counterparts who monitored students' progress on a larger pool of material representing a 12-week goal.

In addition to the STGM teachers predicting better and more realistic short-term performance than did the LTGM teachers, the STGM teachers also judged more often that their students' programs were effective. The STGM teachers, then, felt more satisfied with their students' programs as a function of the type of data they collected. This greater satisfaction may have been realistic given the fact that the STGM teachers predicted short-term success more accurately and higher than did the LTGM teachers.

The STGM teachers' greater satisfaction appeared to lead them to make fewer changes in their students' programs. STGM teachers were free to modify programs as frequently as they deemed necessary to ensure that their students would reach goals. On the other hand, the LTGM teachers, who were required to modify programs at least every 10 days, more often reshaped their students' programs. While teachers in both

groups most frequently made instructional changes in their students' programs, the LTGM teachers made a greater percentage of motivational changes than did the STGM teachers. These motivational changes largely were directed at increasing student performance on the measurement task rather than at substantially changing programs. For instance, LTGM teachers frequently changed their students' programs by introducing reinforcement for increasing words correct on the 30-second word reading test. Therefore, it is not surprising that, despite the LTGM's greater number of programmatic changes, students in both measurement conditions performed similarly throughout the study and, by the end of the 12 weeks, had mastered an equivalent number of words.

While teachers' long-term estimates of student achievement did not differ as a function of their data collection and utilization procedures, their short-term estimates of student achievement, their satisfaction with students' programs, and the number and type of modifications in their students' programs did differ. Teachers who monitored performance on a series of short-term objectives and who were free to modify programs as frequently or infrequently as necessary: (a) were more realistic and less pessimistic about students' short-term achievement, (b) were more satisfied with their students' programs, and (c) made fewer modifications in their students' programs with similar results in student progress as compared with teachers who monitored progress on long-term goals and who were required to modify student programs at least every 10 days. On the basis of these findings, one might recommend to teachers that they monitor students' performance on short-term, rather than long-term, objectives.

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Table 1

Means and Standard Deviations of Predictions and Actual Number of Words Mastered in the LTG

Treatment Condition	Prediction $\bar{X}$	Prediction SD	Actual $\bar{X}$	Actual SD
LTGM				
Original	292.6	295.7	--	--
Final	257.9	125.5	203.1	153.3
STGM				
Original	187.4	128.0	--	--
Final	186.8	141.8	164.8	131.0

Table 2

Means and Standard Deviations of Teachers' Predictions of Rate Correct and Incorrect for Upcoming Interventions

Treatment Condition	Rate Correct		Rate Incorrect	
	X	SD	X	SD
LTMG	19.1	5.2	2.7	1.4
STMG	25.6	6.6	1.7	1.2

Table 3

Percentages of Instructional, Motivational, and Physical Changes in 3-Week Intervals

Weeks	Percentages of Changes		
	Instructional	Motivational	Physical
1-3	68	14	6
4-6	60	32	3
7-9	60	32	5
10-12	49	33	13

Table 4

Percentages of Teachers That Made No Changes in Their Students' Programs from 5 to 12 Times During the Study

Number of Times	Treatment Condition	
	LTMG	STMG
5	2.3	0
6	18.2	0
7	45.5	11.1
8	22.7	5.6
9	4.5	22.2
10	0	19.4
11	0	36.1
12	6.8	5.6

Table 5

Percentages of Teachers that Made Instructional, Motivational, and Physical Changes in Their Students' Programs from 0 to 6 Times During the Study

	Type of Change					
	Instructional[a]		Motivational[b]		Physical[c]	
Number of Times	LTGM	STGM	LTGM	STGM	LTGM	STGM
0	6.8	5.6	27.3	77.8	70.5	88.9
1	20.5	47.2	25.0	13.9	27.3	8.3
2	34.1	27.8	29.5	8.3	2.3	2.8
3	15.9	11.1	11.4	0	0	0
4	9.1	5.6	6.8	0	0	0
5	11.4	2.8	0	0	0	0
6	2.3	0	0	0	0	0

[a] $\chi^2 = 8.1$ ($p = .2300$)

[b] $\chi^2 = 22.3$ ($p = .0002$)

[c] $\chi^2 = 4.7$ ($p = .0970$)

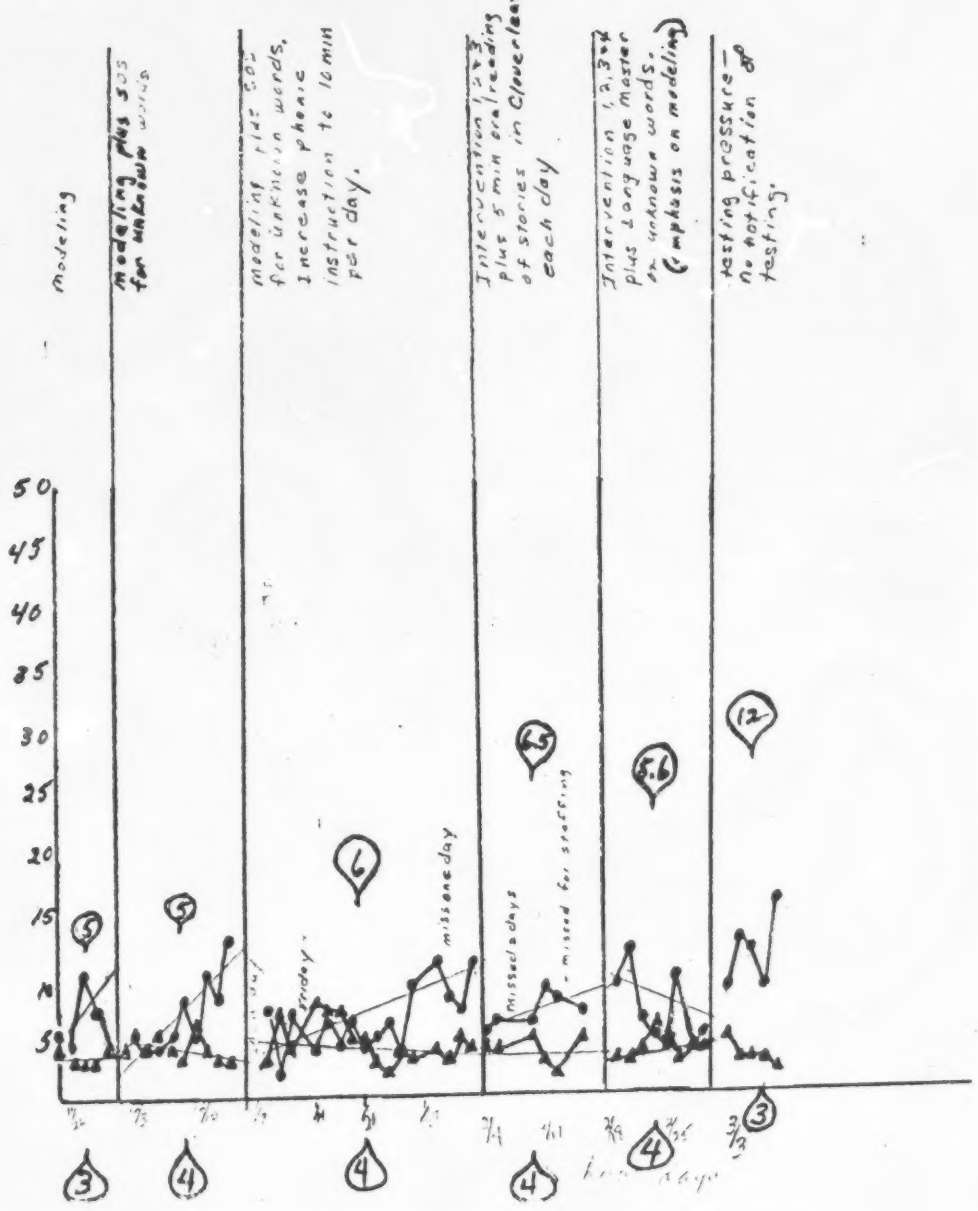
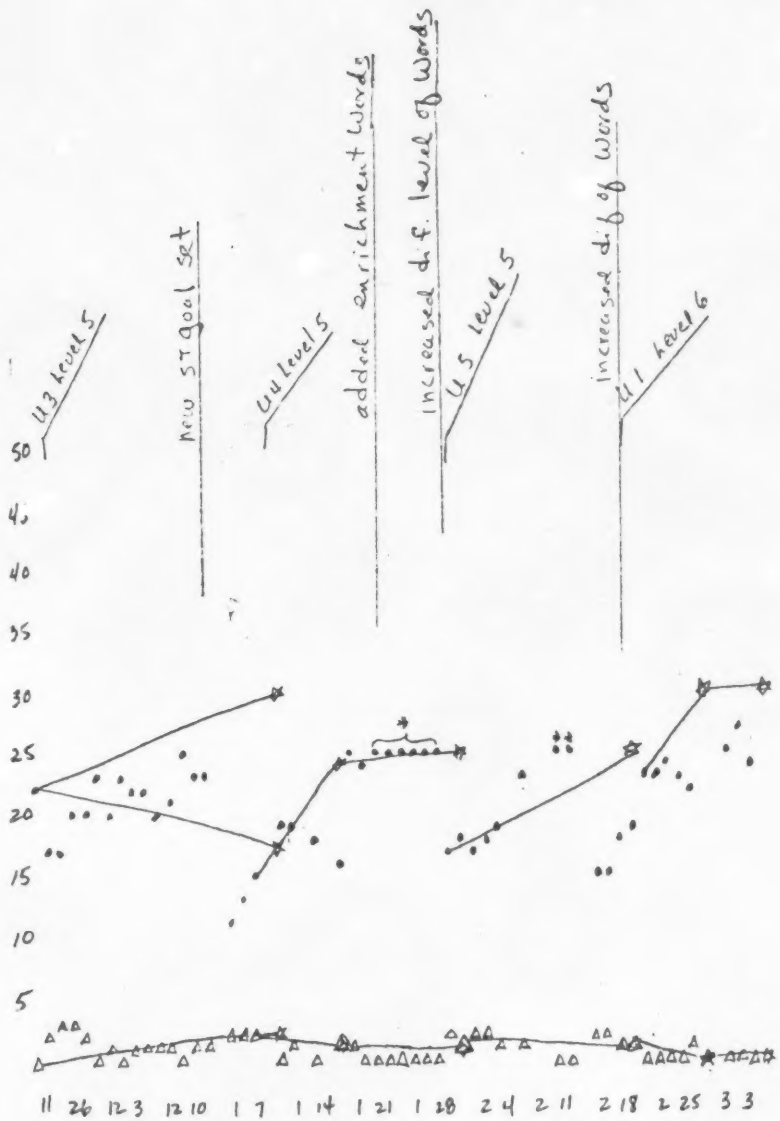


Figure 1. Example of graph for Long-Term Goal Measurement Condition.



correct and # incorrect
per 30 second

Figure 2. Example of graph for Short-Term Goal Measurement condition.

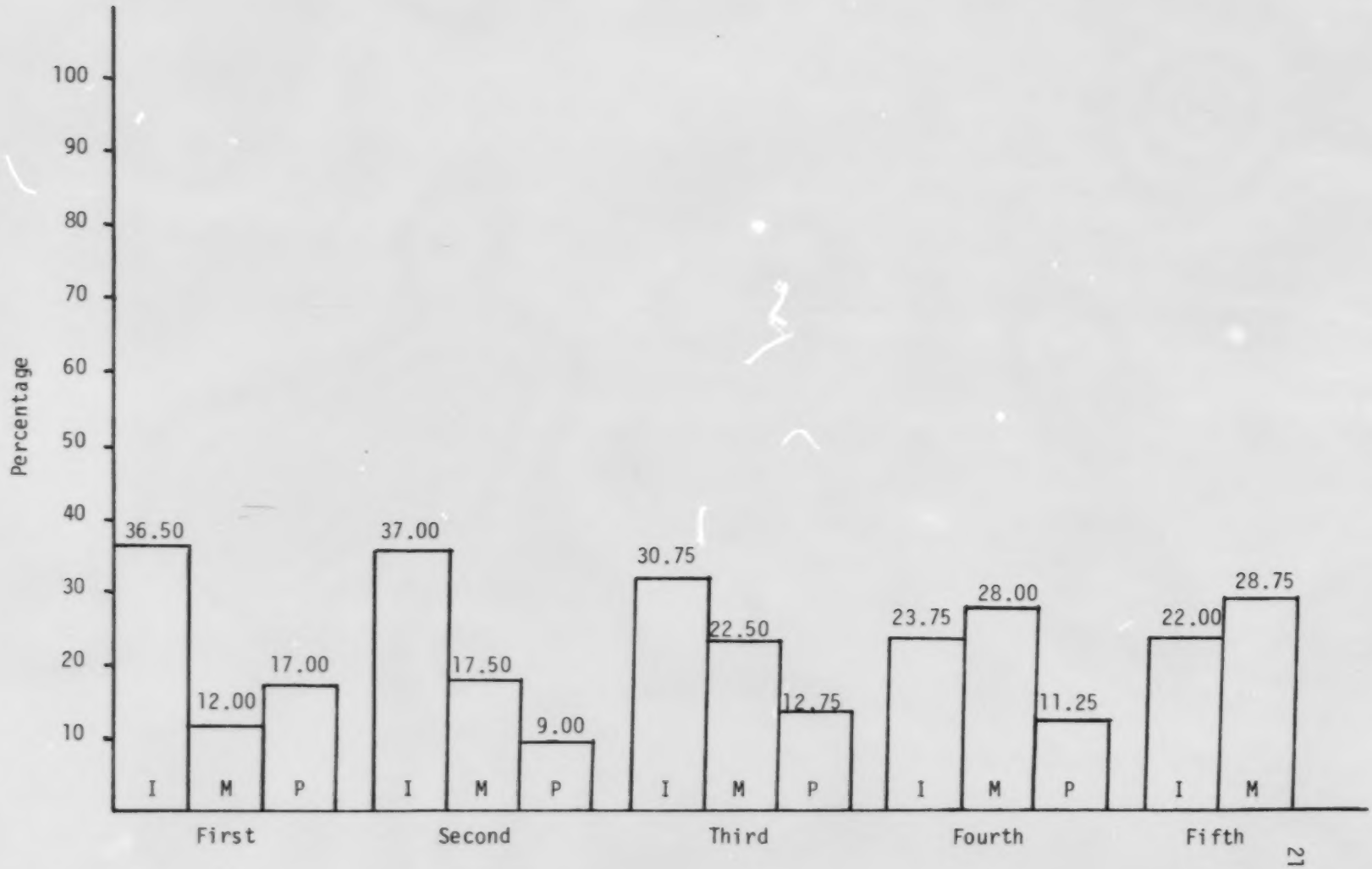


Figure 3. Mean Percentages of Teachers Ranking Instructional (I), Motivational (M), or Physical (P) Changes as First Through Fifth Most Effective.

APPENDIX

Teacher Interview Questions

Student's Name _____ Date _____

	Has teacher made a change?	Was the last change made effective?	What level of performance do you expect using this new strategy?	Errors	Do you think student will meet long term goal?	If no, how much above?	How much below?
Week 1							
Week 2							
⋮							
Week 9							
Week 10							
Week 11							
Week 12							

Teacher Ranking Form

Teacher's Name _____ Date _____

Please rank order from one to five the five changes you believe will be most effective for each student (1 is high and 5 is low).

	Student's name	Student's name	Student's name	Student's name
Instructional Interventions (Making changes in materials or procedures used in instruction)				
1. Change materials				
e.g., Use supplementary workbook Whole word approach Phonics approach				
2. Isolated word practice				
3. Oral reading practice				
4. Reading for comprehension				
5. Modality Training				
e.g., Salt tray Selecting words that begin with the same sound Frostig materials				
6. Modeling				
e.g., Reading along with child				
7. Games and machinery				
8. Other				
Motivational Interventions (Providing incentives contingent on performance and providing feedback)				
1. Show student test and discuss results				
2. Have student score own tests				
3. Have student chart test results				
4. Write contract with student				
5. Provide social rewards				
e.g., Praise Happygrams				
6. Provide activity rewards				
7. Provide tangible rewards				
e.g., Stickers Food				
8. Other				
Physical and Administrative Interventions (Making a change in type and location of instruction)				
1. Peer tutoring				
2. Change student-teacher ratio				
e.g., 1 to 1 or 2 to 1, instead of 4 to 1				
3. Use timer to indicate completion of work periods				
4. Use study carrel				
5. Increase/decrease length of instructional period				
6. Teach student in classroom				
7. Teach student in resource room				
8. Other				

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